The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A method for optimizing data to create one or more photolithographic masks, comprising:

receiving data that represents a physical layer of an integrated circuit;

creating a number of data layers into which data structures that define regions of a mask can be grouped;

creating a number of data structures that represent regions of a mask and assigning each data structure to one of the created data layers

analyzing the data structures assigned to a data layer according to one or more design rules after the data structures have been created; and

fixing a property of each data structure in a data layer in accordance with the analysis performed.

2. The method of Claim 1, wherein at least some of the data structures represent phase shifting areas on a mask, wherein the data structures that represent adjacent phase shifting areas on the mask are assigned to different data layers.

3. The method of Claim 2, wherein the property that is fixed for each data structure that represents a phase shifting area is a phase shift amount, and wherein all data structures that represent phase shifting areas within a single data layer are assigned the same phase shift amount.

4. The method of Claim 3, wherein the phase shift amount requires that the mask be etched and the design rules minimize the area etched on the mask.

5. The method of Claim 3, wherein the phase shift amount requires the application of additional transparent material on the mask, and the design rules minimize the amount of additional transparent material on the mask.

6. The method of Claim 1, wherein at least some of the data structures define areas on the mask that are covered by a partially transparent material and are assigned to a first data layer, and some of the data structures define areas on the mask that overlay an area of a partially transparent material with an opaque material and are assigned to a second data layer that is different from the first data layer.

7. The method of Claim 1, further comprising the step of: performing a lithographic simulation corresponding to the data structures with the properties assigned.

8. The method of Claim 7, further comprising the step of detecting errors in the lithographic simulation and reassigning one or more data structures to another data layer and re-analyzing the data structures in a data layer according to one or more design rules and refixing the properties of the data structures in the data layer in an iterative process to eliminate any errors.

9. The method of Claim 1, wherein the data structures are polygons.

10. The method of Claim 1, wherein the physical layer is a gate layer.

11. The method of Claim 1, wherein the physical layer is an interconnect layer.

12. A method of optimizing data that define phase shifting areas on a photolithographic mask; comprising:

receiving data that describes a physical chip layer to be created on an integrated circuit;

creating a number of data layers;

creating from the data a number of:

data structures that represent areas on the mask that will be opaque or non-opaque to create circuit elements; and

data structures that represent phase shifting regions on the masks, each data structure that represents a phase shifting region having a phase shift amount property;

assigning the data structures to the data layers, such that data structures that represent adjacent phase shifting regions are assigned to different data layers;

analyzing the data structures assigned to a data layer in accordance with one or more design rules after the data structures have been created; and

assigning a common phase shift amount property for the all data structures that represent phase shifting regions and are assigned to the same data layer in accordance with the analysis performed.

13. The method of Claim 12, wherein the phase shift amount property of the data structure represents a degree of etching on the mask, and wherein the one or more design rules minimize the etched area on the mask.

14. A method for creating data used to produce one or more photolithographic masks, comprising:

receiving data that represents a layer in a wafer to be created with the one or more photolithographic masks;

creating a number of data structures that represent phase shifting areas on the one or more photolithographic masks;

analyzing the data structures with one or more design rules after the data structures have been created; and

assigning a property of each data structure in accordance with the analysis performed.

15. The method of Claim 14, further comprising creating one or more data layers and assigning data structures that represent adjacent phase shifting areas into different data layers wherein the analysis is performed on the data structures within a data layer and wherein each data structure with a data layer is assigned the same property.

16. The method of Claim 15, wherein the property is a phase shift amount.

17. A system for creating data used to produce one or more photolithographic masks, comprising:

a database on which is stored data that defines a number of layers of a wafer to be created with the one or more photolithographic masks;

a computer system that executes a sequence of programmed instructions to perform the acts of:

reading data from the database that represents a layer in the wafer to be created with the one or more photolithographic masks;

creating a number of data structures that represent phase shifting areas on the one or more photolithographic masks;

analyzing the data structures with one or more design rules after the data structures have been created;

assigning a property of each data structure in accordance with the analysis performed.

18. A computer readable media on which is stored a sequence of programmed instructions that when executed by a computer, cause it to perform the acts of:

receiving data that represents a layer in a wafer to be created with the one or more photolithographic masks;

creating a number of data structures that represent phase shifting areas on the one or more photolithographic masks;

analyzing the data structures with one or more design rules after the data structures have been created; and

assigning a property of each data structure in accordance with the analysis performed.

19. A system for producing one or more photolithographic masks, comprising:

means for storing data that defines one or more layers of a wafer to be created with the one or more photolithographic masks;

computer means for receiving the data and creating a number of data structures that represent areas on the one or more photolithographic masks at least some of which represent phase shifting areas, the computer means further analyzing the data structures according to one or more design rules after the data structures are created and assigning a phase shift amount to the data structures in accordance with the analysis performed.

20. The system of Claim 19, wherein the computer means groups the data structures having the same phase shift amount into a common data layer.

21. A photolithographic mask that is produced by:

receiving data that represents a layer in a wafer to be created with the one or more photolithographic masks;

creating a number of data structures that represent phase shifting areas on the one or more photolithographic masks;

analyzing the data structures with one or more design rules after the data structures have been created; and

assigning a property of each data structure in accordance with the analysis performed.

22. The photolithographic mask of Claim 21, wherein said mask has a majority of its area defined as clear and opaque areas, plus a lesser percentage as phase shifting areas.